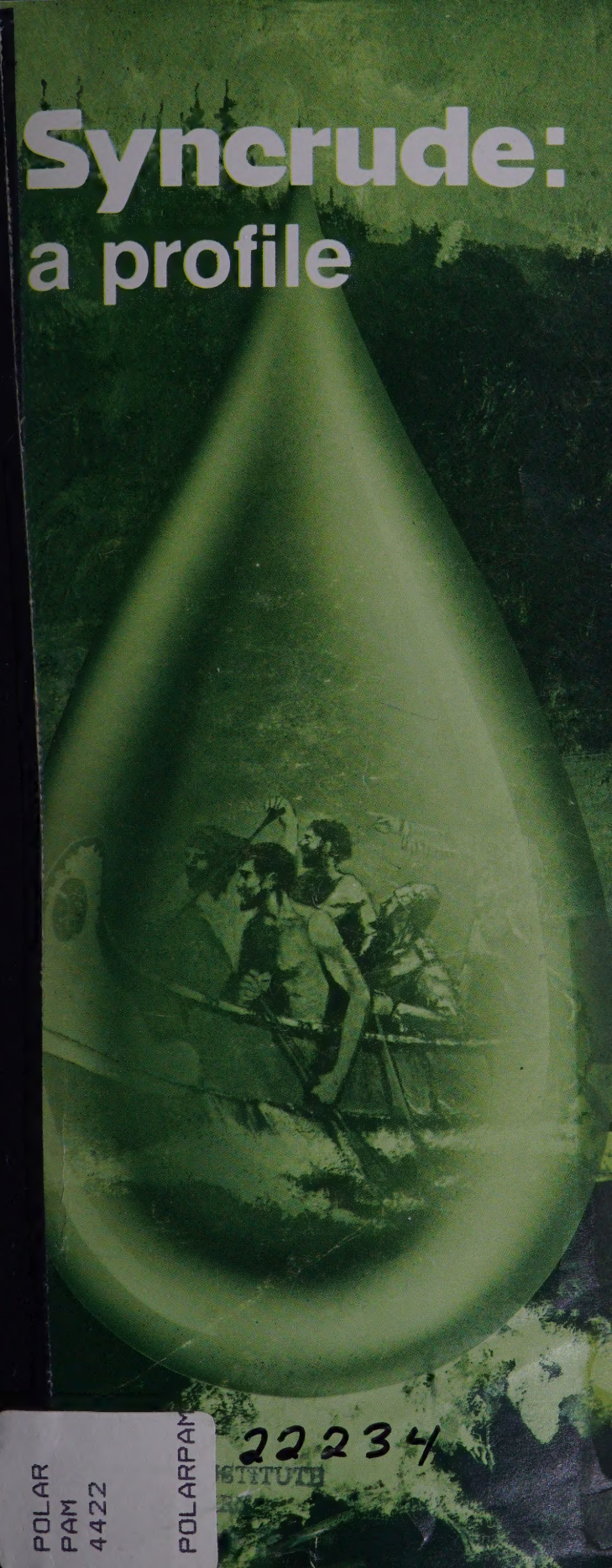
Syncrude: a profile



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HOW THE TAR SANDS BEGAN

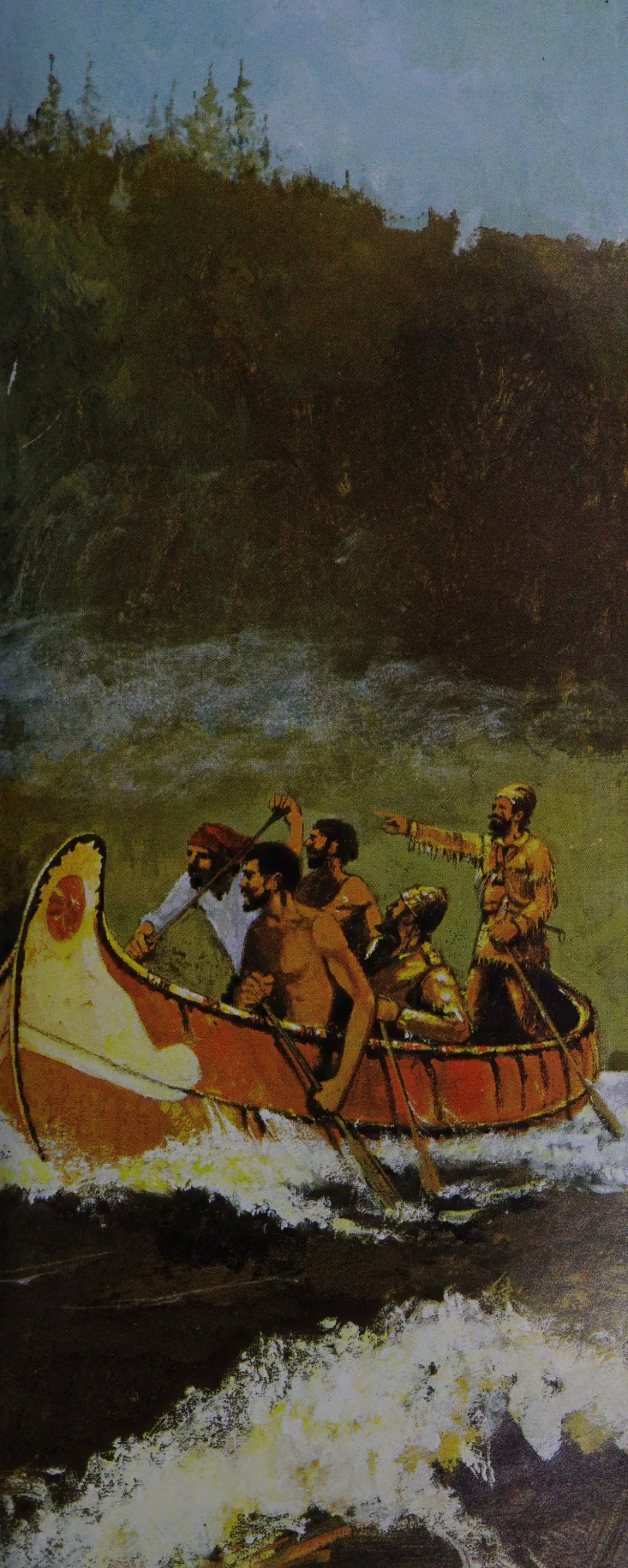
The origin of the Athabasca Tar Sands is shrouded in mystery and controversy. Millions of years ago, much of northern Alberta was covered by a vast, shallow sea teeming with marine organisms; the Tar Sands cover a part of this ancient sea bottom. But where and how was the oil in the Tar Sands formed? And how did it come to be in its present location? Geologists cannot agree on an answer.

Explorer Peter Pond was the first white man to see the Tar Sands, as he ventured down the Athabasca River by canoe in 1778. Ten years later, Pond's successor, Alexander Mackenzie, took more serious interest in the unusual deposits of gooey petroleum he saw seeping from sandy outcroppings in the cliffs high above the river. He wrote in his journal:

"The bitumen is in a fluid state, and when mixed with gum, or the resinous substance collected from the spruce fir, serves to gum the Indians' canoes. In its heated state it emits a smell like that of sea-coal . . ."

In 1875, the first government geological study of the Tar Sands was carried out. Further surveys were initiated in 1882 and 1888. The Tar Sands' fame began to spread. In 1899 the chronicler of the Laird Expedition wrote:

"That this region is stored with a substance of great economic value is beyond all doubt, and, when the hour of development comes, it will, I believe, prove to be one of the wonders of northern Canada."



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Toward the end of the nineteenth century, the first entrepreneurs began to take an interest in the Tar Sands. Some of them were lured by the prospect of quick and easy riches.
But the entrepreneurs soon found that the Tar Sands' secrets were difficult and frustrating to unlock.

SIXTY YEARS OF FRUSTRATION

One of the first Tar Sands developers was a German aristocrat, Count Alfred von Hammerstein, who was en route to the Klondike when he heard about the Tar Sands and decided to prospect for black gold instead. Von Hammerstein reasoned that if the Tar Sands contained so much petroleum in association with sand, there must be, somewhere in the Tar Sands, pools of more liquid petroleum that could be reached by conventional drilling.

He drilled a well at Poplar Island, six miles from McMurray, but went home a disappointed man.

Von Hammerstein was one of the first men to learn that the Tar Sands would not give up their secrets easily. He was not the last.

The search for liquid oil pools in the Tar Sands went on without success. In 1920, the Alberta Research Council began a long-term study to determine how bitumen (as the sticky oil was called) could be separated from the Tar Sands with hot water. As pioneered by an Alberta scientist, Dr. Karl Clark, this "hot water method" of separation became the focus of decades of research, and eventually became the basis of commercial production. But before that happened, entrepreneurs and scientists left the skeletons of abandoned pilot plants up and down the Athabasca River valley in their search for a commercially practical hot water design.

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Interest in the Tar Sands fluctuated according to world energy supply and demand. The beginning of the Second World War brought a freshened interest in the potential of the region. The Alberta Research Council built a pilot plant at Bitumount capable of processing 500 tons of tar sand per day. But the discovery of the Leduc oil field south of Edmonton in 1947 temporarily quenched the enthusiasm of many Tar Sands developers; conventional oilfields in Alberta were closer to markets and production costs were cheaper.

Still, in dozens of laboratories and even basement workshops, scientists and inventors continued looking for better ways of extracting the bitumen from the Tar Sands. Some proposed spinning the tar sand in centrifuges; others proposed mixing it with cold water, attacking it with chemicals or bacteria, bombarding it with ultrasonic radiation, burning it underground, or melting it with an atomic blast. But in the end, serious commercial developers came back to the hot water method.

Time was on the Tar Sands' side. In the late 1950's there was an upsurge of research and development work by private industry; by the early 1960's, an energy-hungry world realized that conventional oil supplies were limited and the price of conventional crude oil was rising. Both factors made the Tar Sands more attractive. In 1967, Great Canadian Oil Sands Limited opened a commercial plant which now has an authorized production capacity of up to 65,000 barrels of synthetic crude oil a day.

In 1969, the Alberta government gave Syncrude approval to build a considerably larger project. In 1971, this project was granted permission to produce up to 125,000 barrels of synthetic crude oil a day.

THE SYNCRUDE ORGANIZATION

Syncrude Canada Ltd. is the operator of a tar sands project funded by three petroleum companies — Canada-Cities Service Ltd., Gulf Oil Canada Ltd. and Imperial Oil Limited — and the Governments of Alberta, Canada and Ontario.

The project began with research and development work on Oil Sands Lease No. 17, about 25 miles north of Fort McMurray, in 1955. Between 1955 and the actual start of construction on the project in late 1973, some $60 million was spent on research and testing of tar sands technology, and preliminary engineering.

TIMING AND MAGNITUDE OF THE SYNCRUDE PROJECT

Syncrude began construction of its project in late 1973 with operations to clear trees and muskeg from the site and drain the area. By the time the project is completed, the total construction and start-up cost of the plant itself is expected to reach some $2 billion, thus making this one of the largest single undertakings in recent Canadian history.

At the peak of construction in 1976 and 1977, the project will employ between 3,000 and 4,000 men and women. Operation of the project will require a permanent staff of more than 1,800 persons resident in Fort McMurray.

According to one study by a leading economist, the project will create over 11,000 permanent new jobs in the Canadian economy. As a result of the expansion brought about by the project, the population of Fort McMurray is expected to grow to some 25,000 by the time the plant begins operation in 1978.

THE TAR SANDS AND CANADA'S FUTURE

The Athabasca Tar Sands are one of the world's largest single energy sources. They contain approximately 600 billion barrels of oil in place.

About half of this oil is either currently recoverable or shows promise of being recoverable in the not too distant future. The part that seems destined for earliest large-scale development is the 110 billion barrels of bitumen sufficiently close to the surface to be eventually mined. These shallow tar sand deposits would produce sufficient bitumen to create 86 billion barrels of synthetic crude oil.

In other parts of the Tar Sand region, there are also some 200 billion barrels of high grade bitumen in deeper deposits which it may some day be possible to tap with "in situ" production techniques. Thus, the Tar Sands

represent an ultimate potential of more than 300 billion barrels of bitumen. This compares with total proved North American reserves of 56 billion barrels of conventional crude oil.

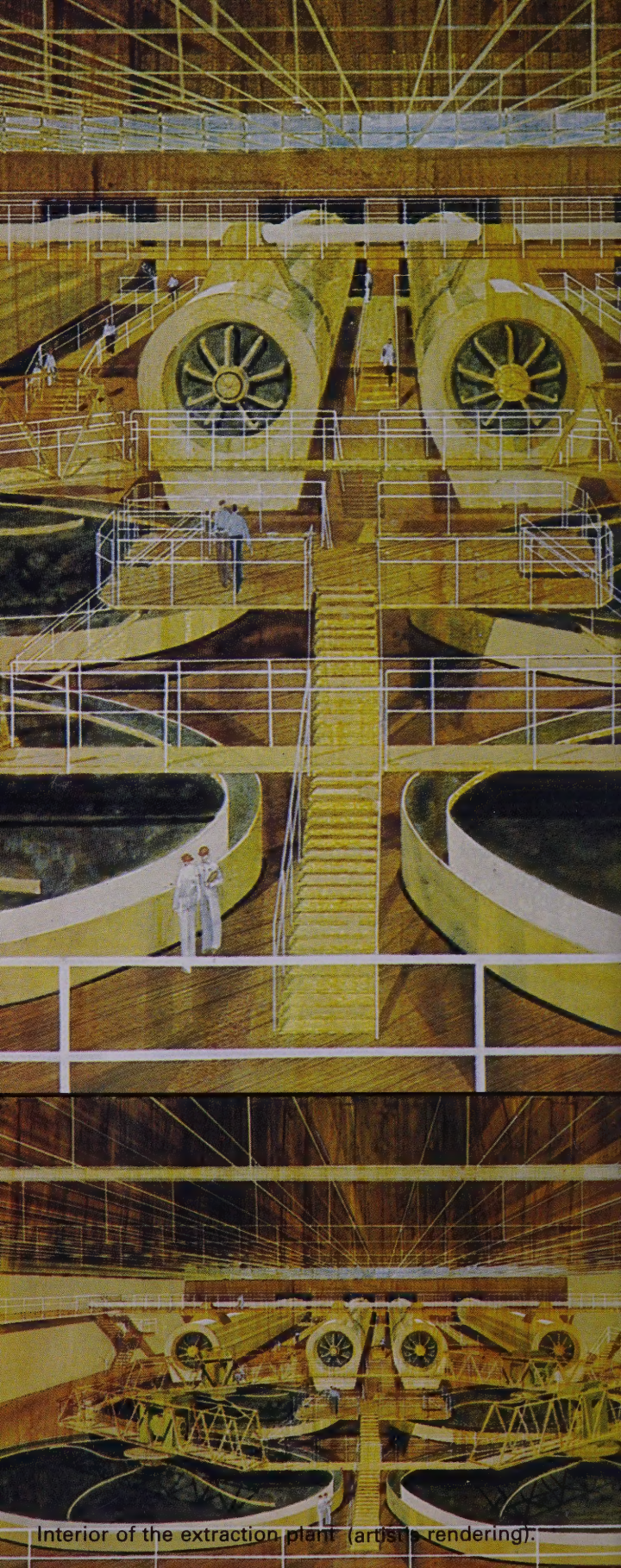
The only comparable oil energy resources in North America are the oil shale deposits in the western United States. The oil shales may contain more than 600 billion barrels of petroleum, but no commercially proven method of producing this oil has yet been demonstrated.

The Tar Sands are also a storehouse of other minerals, including titanium, zirconium and vanadium. Some day, commercial development of this mineral potential may become feasible as well.

The Syncrude project will be the most advanced attempt to achieve large-scale commercial production of synthetic crude oil from the Tar Sands. All over the world, many people are watching the progress of the Syncrude project with intense interest.

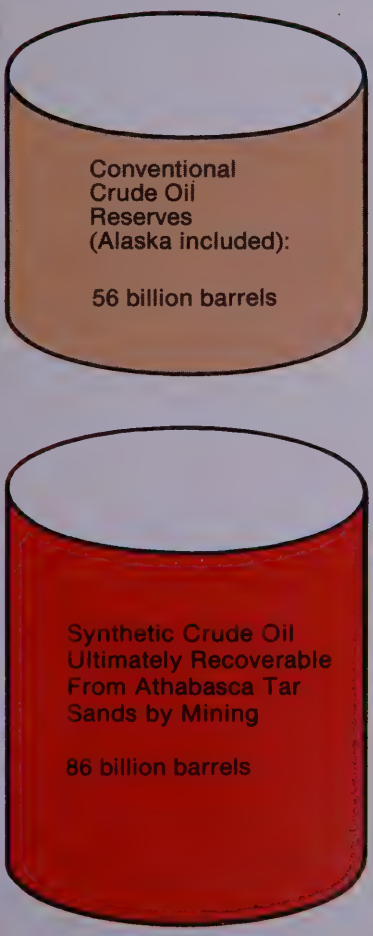
HOW WILL THE PROJECT OPERATE?

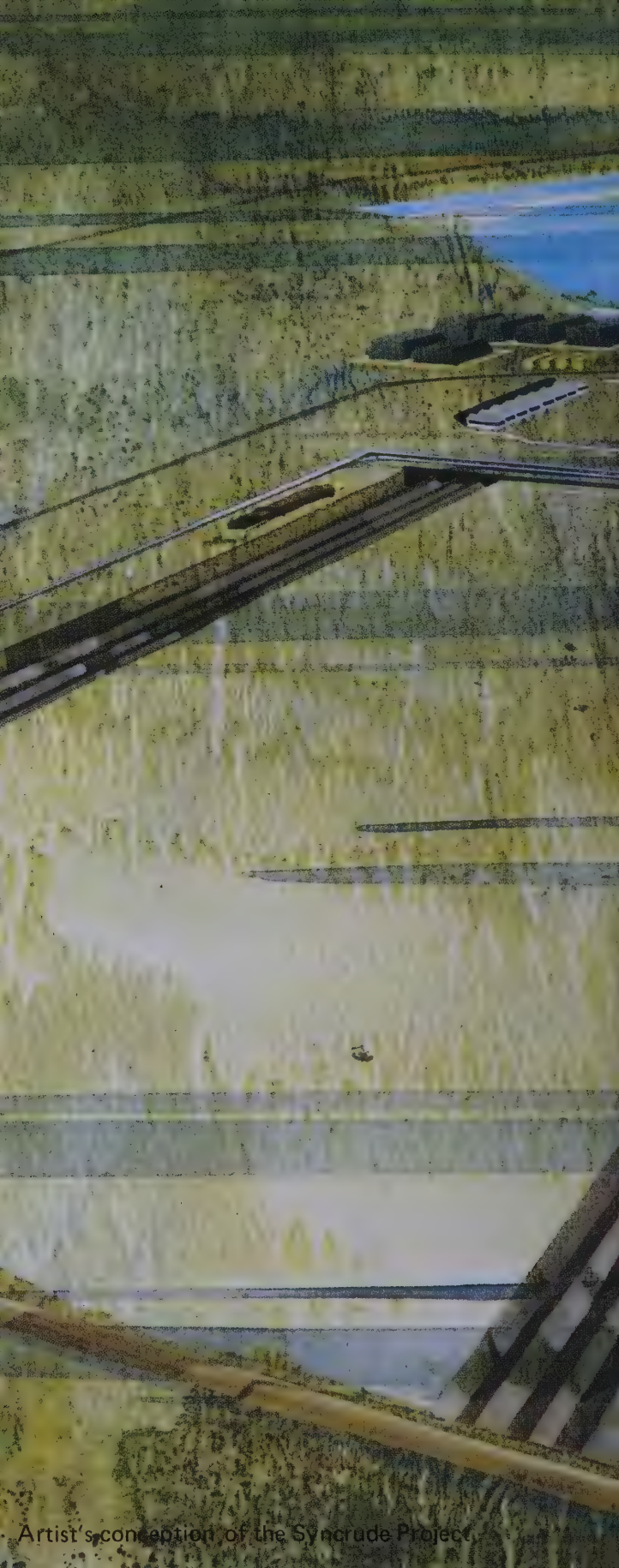
The key to success in tar sands mining is literally the ability to move mountains — every hour of the day, every day of the week, every week of the year. Present Syncrude plans are to use giant draglines and electrically-powered conveyors to mine 9,000 short tons of tar sand per scheduled hour and move it to a processing plant. Once at the plant, the tar sand will be treated with hot water and steam to separate the bitumen from the sand and



Interior of the extraction plant (artist's rendering).

RECOVERABLE PETROLEUM RESERVES IN NORTH AMERICA





Artist's conception of the Syncrude Project

The pulse in operation, as seen through the artist's eye

other solids. The clean sands will be hydraulically returned to the mining site and used in reclamation of the mined-out pit.

The bitumen will have its solids and water removed. Because bitumen in its raw state is impure and highly viscous, it will then be "cracked" and hydrogenated to remove undesirable components and improve its quality. The result will be high-grade synthetic crude oil to help meet Canada's projected needs.

PROTECTING THE NATURAL ENVIRONMENT

Syncrude intends to do everything it can to protect the wildlife, vegetation, appearance and air and water quality of the region, consistent with the commercial development of this natural resource.

Where environmental change is unavoidable, the company intends to contain and minimize this change and to reclaim affected areas to attractiveness and usefulness as soon as possible.

Syncrude conservation plans have been under development for some time. The company began this planning by commissioning its own detailed ecological studies well before construction began. A team of professional ecologists, biologists and environmental engineers is a vital part of the Syncrude organization.

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Although much of the site to be mined is swampy muskeg with little potential for recreation and timber production, Syncrude is developing plans for reclaiming and replanting all surface mining sites. One company objective is a reconstructed drainage system for the reclaimed areas, a system that will actually improve the present surface hydrology of the area.

This culvert will be replaced by a bridge, creating improved water flow on Poplar Creek.

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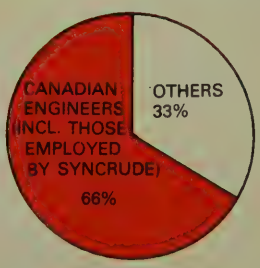
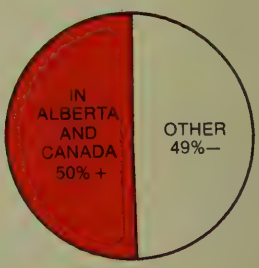
CANADIAN INVOLVEMENT IN THE SYNCRUDE PROJECT

Syncrude people want their project to make a positive contribution to life in Canada. More than 70 per cent of the goods and materials purchased for construction of the project are being purchased in Canada. Canadian engineers are responsible for approximately two-thirds of the total engineering work being done on the project, and Canadian-owned engineering subcontractors have been involved in the design of vital components of the project, thus helping to ensure that distinctive tar sands-type technology will remain in Canada. Canadian governments hold a substantial share of the company's ownership (30%) and, if they exercise all options, would be majority stockholders. Syncrude is energetically developing new programs to train and hire residents of north eastern Alberta for employment in the area.

ENGINEERING WORK ON THE SYNCRUDE PROJECT





Total Engineering
(1.6 million man-hours)

own of Fort McMurray

yncrude project under construction.

FURTHER INFORMATION

Do you have any questions about the Syncrude project? We would be happy to try and answer them. Please write or telephone:

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